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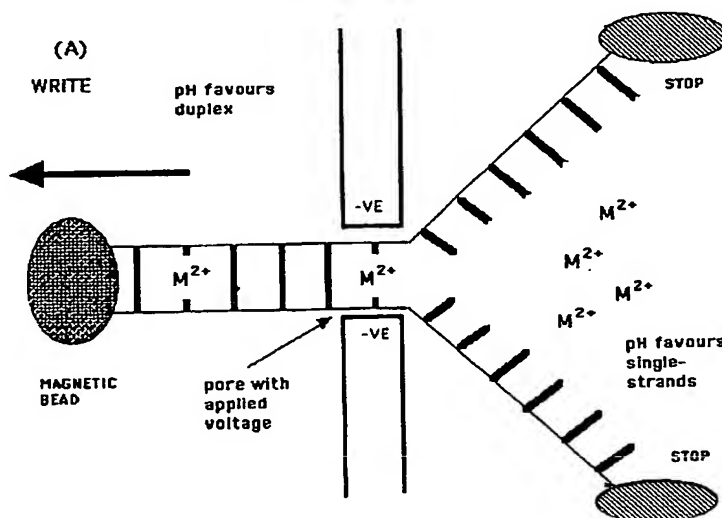
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(54) Title: METHODS AND APPARATUS FOR MOLECULAR DATA STORAGE, RETRIEVAL AND ANALYSIS



(57) Abstract: In various aspects, the invention provides molecular systems for storing and retrieving information. In some embodiments, polymers capable of selectively binding metal ions, such as nucleic acids, are used to record information in the form of a particular molecular conformation. Electrochemical assay methods employing nanopores may be used to read and write information using such polymeric media. In some embodiments, information may be recorded in a nucleic acid polymer by magnetically modulating the translocation of the nucleic acid through a channel in a medium, while simultaneously modulating the electrostatic potential across the channel. In this way, the incorporation of a divalent metal ion in the nucleic acid duplex may be modulated to store information. In an alternative aspect, the invention provides analogous processes for detecting a base pair mismatch in a nucleic acid polymer.

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